



Coastal Protection and Restoration Authority of Louisiana

Office of Coastal Protection and Restoration

2010/2011 Annual Inspection Report

for

EAST SABINE LAKE HYDROLOGIC RESTORATION PROJECT (CS-32)

State Project Number CS-32
Priority Project List 10

October 6, 2010
May 10, 2011
Cameron Parish

Prepared by:

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I. Introduction

The proposed project is located in the western third of the Sabine National Wildlife Refuge (NWR) in Cameron Parish, Louisiana. The project area is bounded on the east by the Burton Sutton Canal, to the south by Starks South Canal, to the west by the eastern Sabine Lake shoreline, and to the north by the approximate northern boundary of Sabine NWR. (See Appendix A).

The East Sabine Lake Hydrologic Restoration Project was authorized by Section 303(a) of Title III Public Law 101-646, the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA) enacted on November 29, 1990 as amended and approved on the first Priority Project List. The East Sabine Lake Hydrologic Restoration Project has a twenty-year (20 year) economic life, which began in June 2009.

II. Inspection Purpose and Procedures

The purpose of the annual inspection of the East Sabine Lake Hydrologic Restoration Project (CS-32) is to evaluate the constructed project features to identify any deficiencies and prepare a report detailing the condition of project features and recommended corrective actions needed. Should it be determined that corrective actions are needed, OCPR shall provide, in the report, a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs (O&M Plan, 2002). The annual inspection report also contains a summary of maintenance projects which were completed since completion of constructed project features and an estimated projected budget for the upcoming three (3) years for operation, maintenance and rehabilitation. The three (3) year projected operation and maintenance budget is shown in Appendix C. A summary of past operation and maintenance projects completed since completion of the East Sabine Lake Hydrologic Restoration Project are outlined in Section IV.

An inspection of the East Sabine Lake Hydrologic Restoration Project (CS-32) was held on two different dates. The inspection of the structures was held on May 10, 2011 under sunny skies and warm temperatures. In attendance were Dewey Billodeau, and Dion Broussard from OCPR, Dale Garber from NRCS, and Darryl Clark from USFWS. The inspection began at the southern end of the rock dike on Sabine Lake and concluded at the Bridge Bayou Culverts. The terrace field in Green's Lake was inspected on October 06, 2010 under sunny skies and cool temperatures. In attendance were Dewey Billodeau, Mark Mouledous and Mike Miller with OCPR, Cindy Steyer and Dale Garber with NRCS, and Darryl Clark from USFWS. The inspection began on the south end of the terrace field and concluded on the northern end.

The field inspection included an inspection of all of the project features. Staff gage readings and existing temporary benchmarks where available were used to determine approximate elevations of water, rock, embankments, and other project features. Photographs were taken (see Appendix B) and Field Inspection notes were completed in the field to record measurements and deficiencies (see Appendix D).

III. Project Description and History

The lower salinity marshes in the project area are converting to shallow, open water due to elevated salinity events and subsidence. Navigation channels provide a direct route for salt water to infiltrate the marsh, disrupt natural water circulation, and allow rapid runoff of fresh water. The larger Sabine-Neches Waterway and the Gulf Intracoastal Waterway (GIWW) have allowed saltwater intrusion into the project area's fresh and intermediate marshes. Elevated tidal fluctuations in these channels have led to increased water flow, which has increased the conversion of marsh to open water. Marsh loss within the project area is also caused by wave action along Sabine Lake and interior marsh shorelines and other natural causes (i.e., subsidence).

To prevent further marsh loss and restore intermediate and brackish marshes, the project features will include: installing a rock weir at Pines Ridge Bayou; installing culverts with stop logs and flap gates at Bridge Bayou; installing rock rip-rap breakwater along the Sabine Lake shoreline at Willow Bayou; installing a weir at the opening at Starks South Canal Section 16 levee; and installing 230,000 linear feet of vegetated earthen terraces in the vicinity of Green's Lake.

Project Objectives

1. Protect and restore intermediate and brackish marshes within the project area.

Specific Goals

The following measurable goals were established to evaluate project effectiveness:

1. Reducing excessive elevated salinities within the Double Island Gully, Pines Ridge, and Green's Lake portions of the project area.
2. Reducing water level variability within the Double Island Gully and Pines Ridge portions of the project area.
3. Reducing the erosion rate along the Sabine Lake shoreline by 50% from Johnson's Bayou to a point north of Pines Ridge.
4. Stopping erosion of the Sabine Lake shoreline from the mouth of Willow Bayou to a point approximately 2,955 feet to the north.
5. Creating 68 acres of marsh in shallow open water areas by the end of the 20 year project life.
6. Increase fisheries and estuarine organism access without adversely affecting salinity levels in the western portion of Sabine NWR.

IV. Summary of Past Operation and Maintenance Projects

General Maintenance: Below is a summary of completed maintenance projects and operation tasks performed since June 2009, the construction completion date of the East Sabine Lake Hydrologic Restoration Project (CS-32).

2007 - Hurricane Rita Repairs to Pines Ridge Bayou Weir and Willow Bayou Rock Realignment – F. Miller Construction - This maintenance project included placing 146 tons of R-300 rock rip-rap along with 794 LF of PVC sheet pile wall at Pines Ridge Bayou Weir. Rock realignment was performed at each end of the dike and rock gaps were placed in two other locations along the shoreline. This maintenance project was a result of damages sustained from Hurricane Rita in 2005 and other maintenance work required. The costs associated with the engineering, design and construction of the Pines Ridge Bayou and Willow Bayou Maintenance Project are as follows:

Construction (CWPPRA)	\$ 74,700.00
Construction (FEMA)	\$143,032.00
E & D, construction oversight, as-builts	\$ 35,026.65
Project Total	\$252,758.65

Structure Operations: There are no active operations associated with this project.

V. Inspection Results

Foreshore Rock Dike

The rock dike is in good condition since completion of construction. There are a few low areas of rock dike that were identified with GPS coordinates and which will be monitored in future inspections for any changes that may be detrimental to the project and require maintenance. Areas behind the rock dike are beginning to show signs of accretion. Vegetation behind the rock dike along the northern reaches has grown out and is touching the back side of the dike. (Photos: Appendix B, Photos 1 - 2)

Rock Weir at Pines Ridge

The rock weir is in good condition after being rebuilt after Hurricane Rita. No signs of erosion are evident around the bank slopes. (Photos: Appendix B, Photo 3).

Double Island Plug

This site was not inspected on this trip due to logistics problems.

Earthen Terraces (report submitted by Cindy Steyer with NRCS, and Darryl Clark Project Manager/Senior Fish and Wildlife Biologist)

Background: The CS-32 East Sabine Hydrologic Restoration Project lies east of Sabine Lake in Cameron Parish, Louisiana. The project area lies within brackish marsh habitat where the typical average monthly water salinity normally ranges from 3 to 8 ppt throughout the year. This report summarizes a field check of the vegetation component of this project, particularly of the most recent Construction Unit 1B planting installed in July 2009.

This project's construction and plantings were implemented in multiple actions as a result of interruptions and impacts from hurricanes, and a surplus of project funds later allowed for construction of additional terraces. The following is a summary list of the actions to build, and plant or replant the project terraces:

- | | | |
|-------|------|---|
| CU-1 | 2005 | Original contract work to install 171,000 LF of terraces and 142,500 transplants (Figure 1) was 54% complete when interrupted by hurricanes Katrina and Rita. |
| CU-1 | 2006 | Resumed work Post-Rita to complete the remaining 46% of terraces, and the contract was modified to replant damaged terraces with an additional 42,500 transplants. |
| CU-1A | 2008 | Contract to install an additional 50,000 LF of terraces with 41,000 transplants (Figure 2) was nearly complete when interrupted by hurricane Ike (two Row 1 segments not constructed, remainder of Row 1 not finished to grade or planted). |
| CU-1B | 2009 | Contract to replant damaged CU-1A terraces with 32,200 transplants. |

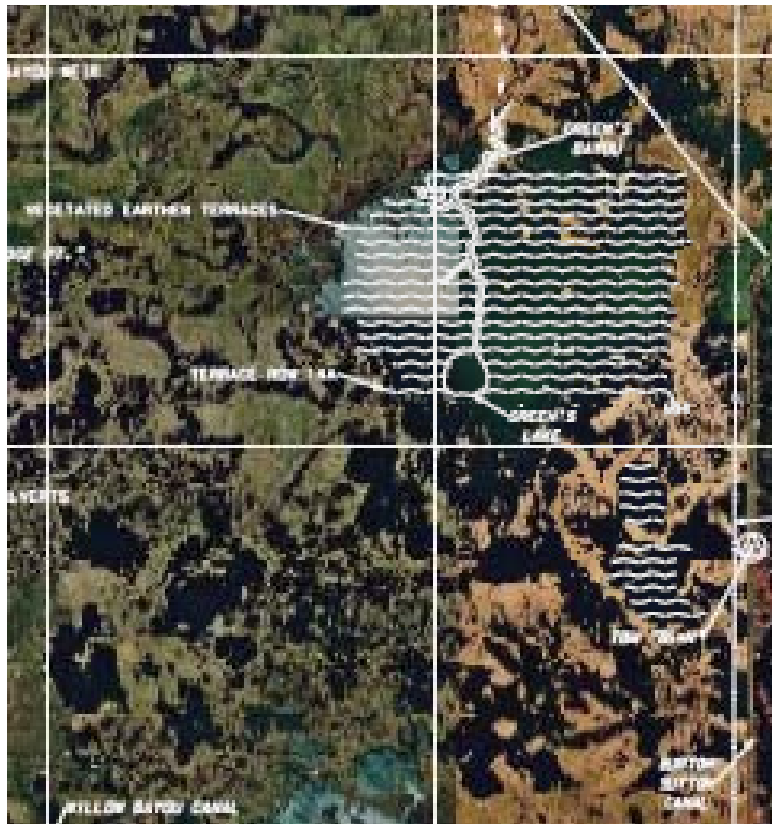


Figure 1. CU-1 contract plan for 171,000 LF terraces and vegetative plantings.

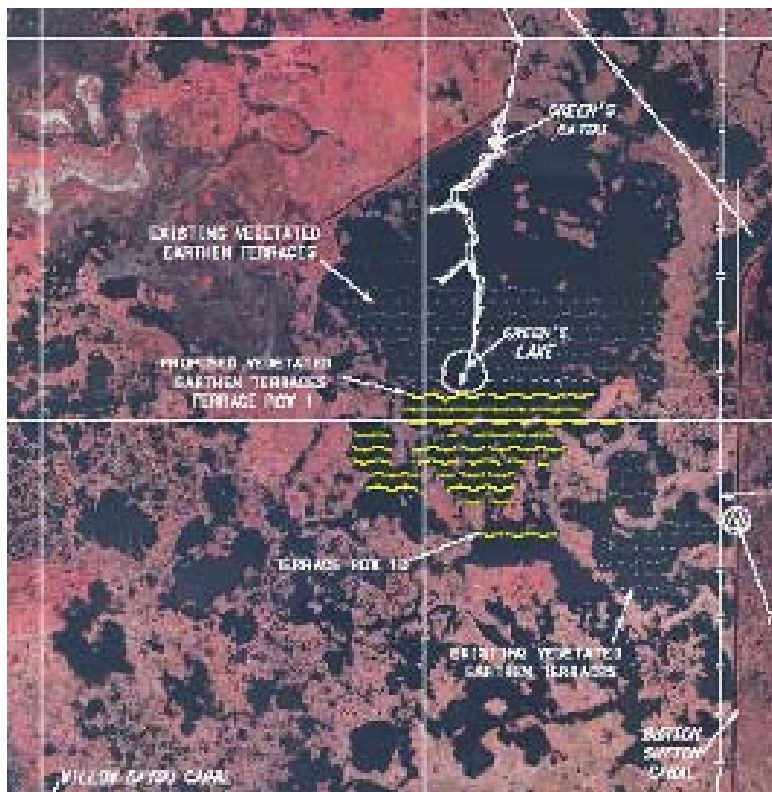


Figure 2. CU-1A contract plan for 50,000 LF terraces and vegetative plantings.

For details of hurricane damage and vegetative planting assessments, and recommendations throughout this project's construction phase to date, see May 2006 Trip Report - Subject: *East Sabine Lake Hydrologic Restoration Project (CS-32) Post-Hurricane Damage Assessment of Terrace Vegetation October 27, 2005 and April 3, 2005*; and February 2009 Trip Report - Subject: *CU-1A Post-Hurricane Damage Assessment of Terrace Vegetation*; and April 2010 Trip Report – Subject: *CU-1A Field Check of Terrace Vegetation March 18, 2010*.

Findings: On October 6, 2010, the team of above attendees traveled by two airboats from the Cameron Meadows boat landing to the project site to check the condition of the terraces and plantings. The field party generally moved from south to north through the entire project area– from CU-1 Rows 16 to 25, to CU-1A/B Rows 11 to 1, to CU-1 Rows 14A to 1B. Water salinity and soil EC was measured at sites along a north-south transect, and six soil samples from within the CU-1A/B terraces were collected for Mike Lindsay, NRCS soil scientist, to perform a lab check on EC using a saturated paste method of analysis. Water salinity within the project area on that date ranged from 7.5 ppt to 9.8 ppt.

The vegetative growth of smooth cordgrass on the oldest and southeasternmost CU-1 Rows 16 to 25 looked excellent, as did that on newer CU-1A/B Rows 11 to 8, and the coverage was nearly 100%. The few gaps that were occasionally present on a few segments were minor and some gaps were occupied by other species such as seashore paspalum (*Paspalum vaginatum*) where the terrace crown was above the water elevation on this date.







The estimated survival of the newer CU-1A/B plantings was very good in Rows 5 to 11 (greater than 80%), although the size of the gaps were more significant and narrowing of some terrace segments became more noticeable as we neared Row 5.







As the party continued north, the survival estimates for the rows dropped dramatically and ranged from fair to poor (5% to 50%) on the CU-1A/B Rows 4 to 2, but the vegetation that did remain appeared to be recovering well and for the most part looked very healthy.





There were a few exceptions however where some plants appeared to be struggling, but those were generally found where the terrace segments were severely impacted and were obviously narrowed with lower crown elevation.



The survival on CU-1A/B Row 1, south of Green's Lake, was about 75%. Here again, the surviving plants looked very healthy and provided nearly 100% cover across the crown in some spots, but there were also other stretches bare of vegetation more than 100 feet long on this row.







The older CU-1 Row 14A terraces continue to be in very good shape, and well covered with vegetation (below). Most of the crown cover however was from a variety of other pioneering species, mainly seashore paspalum and marshhay cordgrass (*Spartina patens*), but seashore elder (*Iva imbricata*), leafy three-square (*Schoenoplectus maritimus*), goldenrod (*Solidago* sp.) and sedges (*Cyperus* spp.) were also present, as well as saltmarsh aster (*aster tenuifolius*), cattail (*Typha* spp.), camphorweed (*Pluchea camphorata*) and marsh morningglory (*Ipomoea sagittata*), and walter's millet (*Echinochloa walteri*). The smooth cordgrass at the toe of this row's segments actually looked in poor shape, and the cover it provided was sparse along some edges.





Overall, the southern rows of CU-1 group looked stable though some had obviously narrowed. There were some areas of loss observed, but there was no discernable pattern that might explain the loss, or why the smooth cordgrass was not recovering well on some segments or in spots, but on others, though providing thin cover, the individual plants looked fairly robust.





Continuing north, the survival and cover on the CU-1 terraces was found to vary quite a lot. Many terrace segments were much narrower and had poor to no cover, but there were other segments where the cover was good and the terraces retained their width. Overall though, there were only a few sites found where individual smooth cordgrass plants looked as robust as those seen to the south. It almost appeared that some plantings were just beginning to re-emerge and expand the cover.















The water salinity and soil EC data, and the vegetative coverage estimates recorded by the field party are attached. A lot of photographs have been included in this report to fully illustrate just how widely the condition of the terraces and plantings ranged over the 221,000 LF (nearly 42 miles) of terraces. Over the entire project, I would estimate that vegetative cover of the terraces is at approximately 50%. The impact of the combination of storms and

repeated years of drought had been extreme, although the current soil and water salinity/EC conditions on this date were well within tolerable ranges for smooth cordgrass. A large portion of the remaining plantings still appear to be in a recovery mode and may just require more time to achieve desired vigor and expansion.

Recommendation: The project team discussed options and it is recommended that the construction phase of this project be closed out. The remaining plantings are expected to continue to recover and expand but where there are large stretches of missing plants, it is advisable to re-vegetate with additional plantings that can be conducted through O&M. I recommend that an O&M planting to target areas with poor to no cover be planned for TY1 or 2, and could probably be accomplished for less than \$100,000 (not amortized \$). To provide for adequate cover to be maintained throughout the 20-year project life, O&M funds should also be available for an additional O&M planting event if it becomes necessary later in the project life. Darryl Clark has confirmed that there currently is \$254,428.04 in the project O&M budget, which is sufficient to fund a TY1 or 2 planting. OCPR typically implements the O&M activities, but if USFWS & OCPR agree, NRCS can design and implement the planting.

The condition of the terraces and plantings should be reassessed again by the end of October 2011 at which time a more accurate estimate of the replanting needs will be made.

Over 45 miles (237,600 linear feet) of vegetated earthen terraces were constructed mostly in 2005 adjacent to the Green Lake area of Sabine National Wildlife Refuge. The second group of 50,000 linear feet of terraces were constructed and planted in 2008 with a lower elevation and smaller crown (9-feet wide) than the original terraces. CRMS station No. 660 water level and salinity data equaled 1.3 feet NAVD and 9.1 ppt respectively. The following are notes from the October 6, 2010 field trip.

Terrace Row	Percent Vegetated	Condition of Plantings	Salinity (ppt)
11	100%	Smooth cordgrass ins in good condition.	8.8
10		Some portions thinly vegetated	
7-4	> 80%	Narrow terrace some bare sections > 50 to 100 feet bare	7.9
7-3	> 80%		
7-2	> 80%		
7-1	> 80%		
5-1	> 70%		
5-2	50%		
5-3?	> 80%		
5-4	> 80%	Good re-vegetation	
5-5	> 80%	Some thin spots	
5-6	> 80%		
5-7	> 80%	Minor bare spots	
5-8	> 80%		
3-1	10%		
3-2	20%		9.3
3-3	25%		
3-4	50%		
3-5	50%		
3-6	10%		
3-7	5%		9.7
3-8	25%		
1-1 & 1-2	N/A	Terraces not constructed.	
1-3	75%	Bare spots > 100 feet long	
1-4	75%		
1-5	50%		
1-6	20%	1,000 unvegetated	
1-7	20%	1,000 unvegetated	
1-8		submerged	
Green Lake Terraces	50%	Most terraces were 15 – 20 feet wide with bare spots. Stubble remains of some vegetation. Some vegetation spread > 5 feet from the terrace platform.	8.4

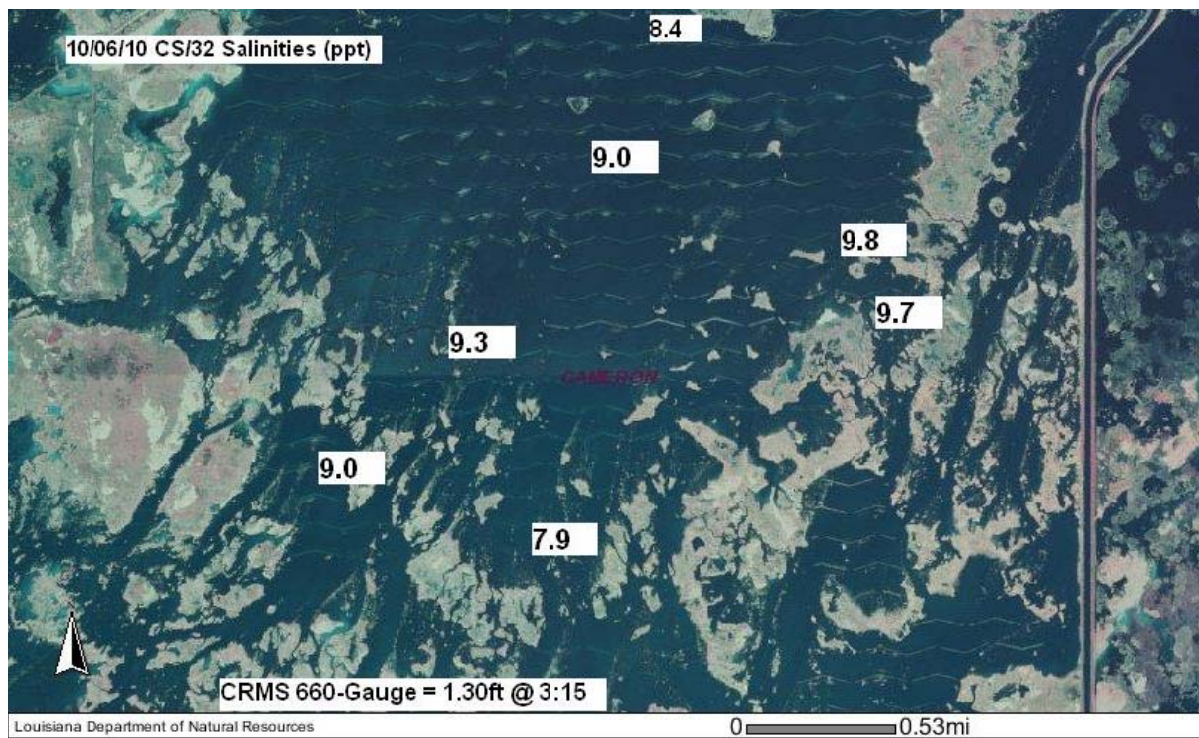
Overall on some of the poorer terraces the vegetative cover was 20% or less, on others greater than 80%. The overall mean vegetative cover may be closer to about 50%. It is hopeful that in the near future terraces with poor vegetative cover will recover with natural re-vegetation.

The project team decided not to do a third planting of the lasts 2008 constructed terraces. We will close out project first construction costs and E&D and begin the O&M phase. Some vegetative planting O&M may be added in the future to the O&M budget if necessary.

Table 1. Water & Soil Salinities, etc.

Way-point	Water Salinity (ppt)	Soil Depth (in)	Soil EC Field Probe (mS/cm ³)	Soil EC* Lab Sat Paste (mS/cm ³)	Temp (°C)	Notes
N/A	8.3					At Cameron-Meadows boat landing
632	7.5					CU-1 row 22 segment 3(?); pre-Rita
635		4"	6.02		24.5	CU-1A row 11 segment 1 (south of Row 10); post-Rita, pre-Ike
		12"	6.95			
636		6"	5.55	6.85		CU-1A row 8 segment 5; post-Rita, pre-Ike; (soil sample labeled 'row 8')
		12"	5.35			
637	9.5	6"	6.78			CU-1A row 5 segment 5; post-Rita, pre-Ike
		12"	8.00			
638	8.3	6"	5.46	6.77	23.6	CU-1A row 2 segment 5; post-Rita, pre-Ike: Water EC 14.7 (soil sample labeled 'row 2')
		12"	4.27			
639	9.6	6"	4.57	4.41	24.0	CU-1 row 14(A) noted as segment 5 but segment 4; pre-Rita (soil sample labeled 'row 14')
		12"	6.54			
640	8.4	6"	6.21	7.68	23.5	CU-1 noted as row 7- but row 8 segmt 6; pre-Rita; water EC 14.9; (soil sample labeled 'row 7')
		12"	3.50			
641	8.6	6"	5.68	6.82	23.9	CU-1 noted as row 3- but row 4 segment 4; post-Rita, pre-Ike; (soil sample labeled 'row 3')
		12"	5.66			
642	8.0	6"	3.55	6.98		CU-1 noted as row 1B- but row 1A segment 2; post-Rita, pre-Ike; (soil sample labeled 'row 1B')
		12"	3.65			
CRMS 660	9.1	*6"	13.5			WL 1.3' @ 3:15 pm; *soil EC reading from native soil; site S of WP 632 & 635
		*12"	6.0			
643	7.4					Location in marsh area just west of Burton-Sutton Canal
644	7.9					At intersection of Burton-Sutton and Starks Canals
						*EC Lab reading is an average of two samples

Waypoint Map for October 6, 2010 Field Data from NRCS for Table 1



Map for October 6, 2010 Salinity Data from OCPR – Mike Miller, Monitoring Manager, OCPR Lafayette Field Office

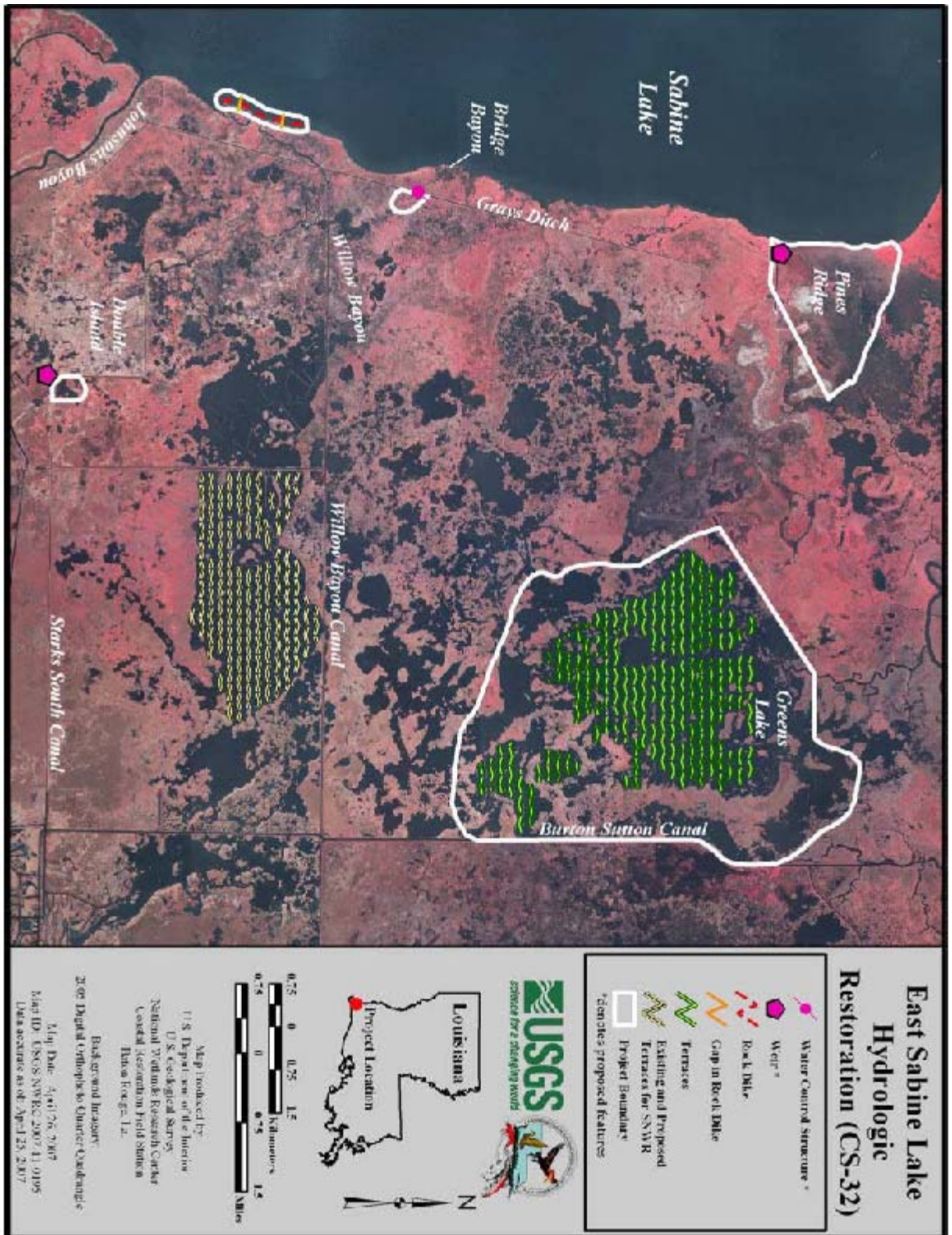
Bridge Bayou Culverts

The culverts at this location are in good condition. No erosion was evident at this site. There was difficulty in getting to and from this site by cabin boat. Future inspections will require the use of an airboat. (Photos: Appendix B, Photo 4).

VI. Conclusions and Recommendations

Overall, the East Sabine Lake Hydrologic Restoration Project is in good condition with structures functioning as designed. Some of the vegetation on the terrace field in Green's Lake has not performed well and has left the terraces bare. As discussed above, a return trip to the project site will be conducted in late fall to further assess the condition of the vegetative plants on the terraces.

Appendix A
Project Features Map



Appendix B

Photographs



Photo No.1 -Typical fish dip along rock dike with warning sign



Photo No. 2 -Typical rock dike showing accretion between dike and shoreline



Photo No. 3 – Pines Ridge Weir



Photo No. 4 – Bridge Bayou Culverts

Appendix C

Three Year Budget Projection

EAST SABINE LAKE HR/ CS-32 / PPL 10
Three-Year Operations & Maintenance Budgets 07/01/2011 - 06/30/2014

<u>Project Manager</u>	<u>O & M Manager</u>	<u>Federal Sponsor</u>	<u>Prepared By</u>
Darrell Pontiff	Dewey Billodeau	USFWS	Dewey Billodeau

	2011/2012 (-2)	2012/2013 (-3)	2013/2014 (-4)
Maintenance Inspection	\$ 6,086.00	\$ 6,269.00	\$ 6,457.00
Structure Operation			
State Administration		\$ -	\$ -
Federal Administration		\$ -	\$ -
Maintenance/Rehabilitation			

11/12 Description:

E&D	
Construction	
Construction Oversight	
Sub Total - Maint. And Rehab.	\$ -

12/13 Description

E&D	\$ -
Construction	\$ -
Construction Oversight	\$ -
Sub Total - Maint. And Rehab.	\$ -

13/14 Description:

E&D	\$ -
Construction	\$ -
Construction Oversight	\$ -
Sub Total - Maint. And Rehab.	\$ -

	2011/2012 (-2)	2012/2013 (-3)	2013/2014 (-4)
<u>Total O&M Budgets</u>	<u>\$ 6,086.00</u>	<u>\$ 6,269.00</u>	<u>\$ 6,457.00</u>

<u>O & M Budget (3 yr Total)</u>	<u>\$ 18,812.00</u>
<u>Unexpended O & M Budget</u>	<u>\$ 256,970.00</u>
<u>Remaining O & M Budget (Projected)</u>	<u>\$ 238,158.00</u>

Appendix D

Field Inspection Form

Annual Inspection Report
EAST SABINE LAKE HR
State Project No. CS-32

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: CS-32 East Sabine Lake HR

Date of Inspection: October 06, 2010 Time:
May 10, 2011

Structure No.

Inspector(s): Dewey Billodeau, Mike Miller, Dion Broussard (OCPR)
Mark Mouledous (OCPR), Dale Garber and Cindy Steyer (NRCS), Darryl Clark (USFWS)

Structure Description: Rock Dike, Terraces, Culverts, Rock Weir

Water Level Inside: +0.75 Outside:

Type of Inspection: Annual

Weather Conditions: Partly Cloudy and Cool (3/11)
Sunny and warm (5/11)

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Bridge Bayou Culverts	Good			4	Culverts don't appear to be functioning and allow minimal water passage.
Steel Grating	N/A				
Stop Logs	N/A				
Hardware	N/A				
Timber Piles	N/A				
Timber Wales	N/A				
Galv. Pile Caps	N/A				
Pines Ridge Weir	Good			3	
Signage / Supports	Good				
Foreshore Rock Dike	Good			1,2	
Earthen Terraces	Fair				The condition of the vegetative plantings varied throughout with approximately 50% establishment on average. Salinity ranged between 7.4 - 9.7 ppt

What are the conditions of the existing levees? N/A
Are there any noticeable breaches? No
Settlement of rock plugs and rock weirs? No
Position of stoplogs at the time of the inspection? N/A
Are there any signs of vandalism? No

Appendix E

Locations to be Monitored